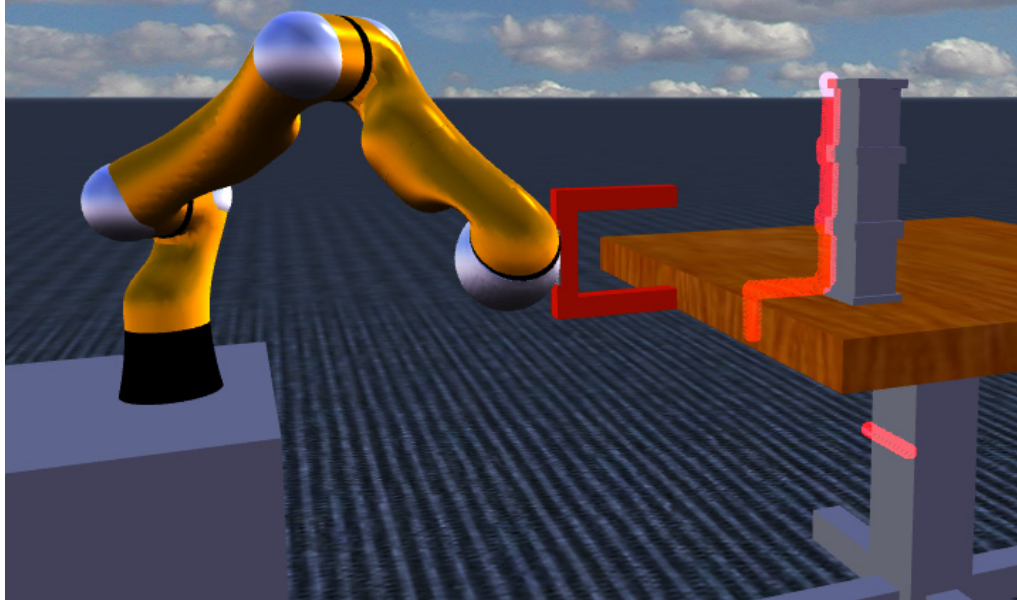


KUKA EDUCATIONAL FRAMEWORK



www.kuka.com



KUKA EDUCATIONAL FRAMEWORK

KUKA as a Technology Leader in robotics presents the KUKA Educational Framework. The framework is intended to provide an introduction to the world of programming robotics. Students can easily follow and extend the programming examples provided. Three groups of tutorials are presented:

Robot Arm Tutorial

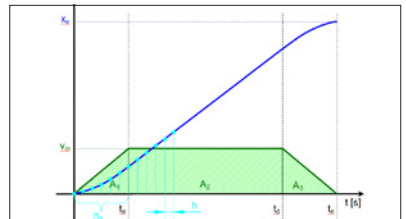
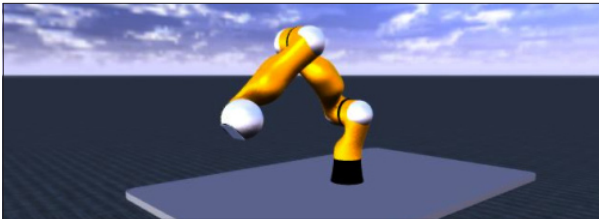
Teaches how to:
calculate and orchestrate robot arm motions

Mobile Platform Tutorial

Teaches how to:
add a platform and sensors to the robot

Task Tutorial

Teaches how to:
add program logic for an autonomous task solution



The robot arm tutorials describe the mathematics of arm motion in time and space, along with suggested implementation.

$$v_{m,i} = \frac{t_{e,\max} \cdot \hat{a}_{m,i}}{2} - \sqrt{\frac{t_{e,\max}^2 \cdot \hat{a}_{m,i}^2}{4} - \hat{a}_{m,i} \cdot \hat{x}_{e,i}}$$

```
velocity[i] = (float)((_state.MaxJointAcceleration * temax / 2)
- (Math.Sqrt((_state.MaxJointAcceleration *
_state.MaxJointAcceleration * temax * temax / 4) -
(Math.Abs(changes[i] * _state.MaxJointAcceleration)))));
```

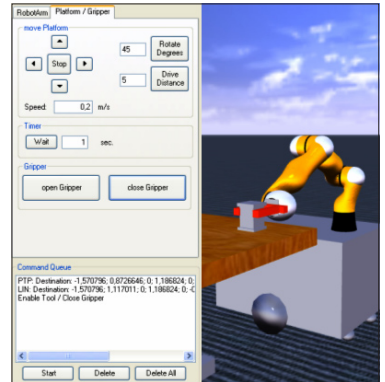
This includes the planning of motion as well as the forward and inverse transformations between end-of-arm tool position and the six joint positions.

The mobile platform tutorials show how to use the robot arm in an integrated machine, adding a movable platform and a gripper.

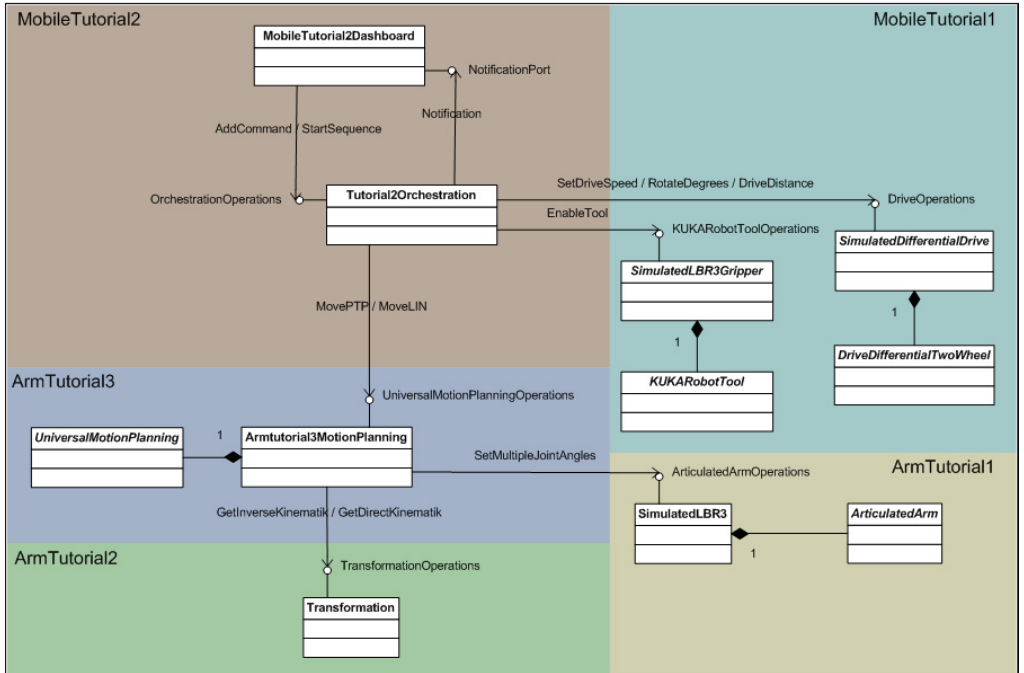


The tutorials show you how to queue commands for all active devices and to create simple programs for the machine.

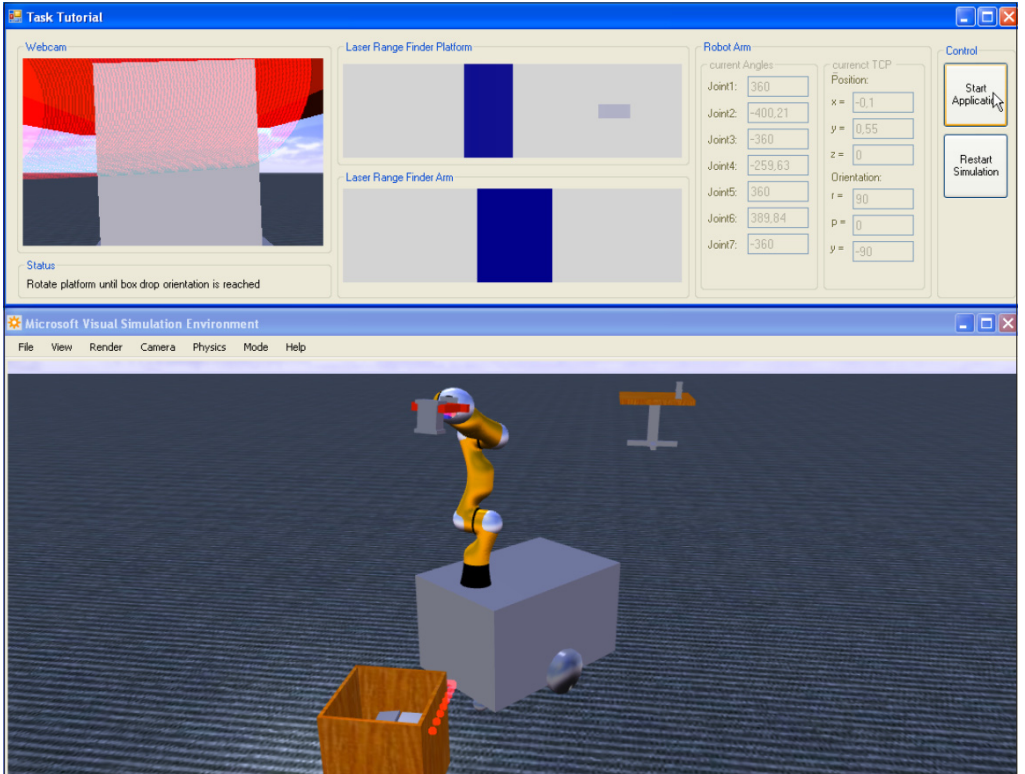
The Microsoft Robotics Studio uses a modular structure of services, making it easy for you to locate and replace code of interest. The tutorials show you how to link together the needed services.



All the coding is service based with well defined interfaces, making it easy for you to replace our implementations with your own code.



KUKA EDUCATIONAL FRAMEWORK



The task tutorial shows how to orchestrate sensors with the mobile robot to navigate and execute complex tasks autonomously. Laser range finders measure the near surroundings while the integrated webcam shows the operator the end-of-arm perspective.

Tutorials coming soon on
www.kuka.com